



Report No: FCC 1708062 File reference No: 2017-08-15

Applicant: SHENZHEN HOTOP ELECTRONIC TECHNOLOGY CO.,

LTD.

Product: Remote Control

Model No: VR20, ARV13, PBVR21

Trademark: N/A

Test Standards: FCC Part 15.247

Test result:

It is herewith confirmed and found to comply with the

requirements set up by ANSI C63.10, FCC Part 15.247 for the

evaluation of electromagnetic compatibility

Approved By

Jack Chung

Jack Chung

Manager

Dated: August 15, 2017

Results appearing herein relate only to the sample tested

The technical reports is issued errors and omissions exempt and is subject to withdrawal at

SHENZHEN TIMEWAY TESTING LABORATORIES

Room 512-519, 5/F., East Tower, Building 4, Anhua Industrial Zone, Futian District, Shenzhen, Guangdong, China

Tel (755) 83448688, Fax (755) 83442996, E-Mail:info@timeway-lab.com

Report No.: FCC1708062 Page 2 of 44

Date: 2017-08-15



Special Statement:

The testing quality ability of our laboratory meet with "Quality Law of People's Republic of China" Clause 19.

The testing quality system of our laboratory meet with ISO/IEC-17025 requirements, which is approved by CNAL. This approval result is accepted by MRA of APLAC.

Our test facility is recognized, certified, or accredited by the following organizations:

CNAL-LAB Code: L2292

The EMC Laboratory has been assessed and in compliance with CNAL/AC01:2002 accreditation criteria for testing Laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of testing Laboratories.

FCC-Registration No.: 899988

The EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications commission. The acceptance letter from the FCC is maintained in our files. Registration No.: 899988.

Page 3 of 44

Report No.: FCC1708062

Date: 2017-08-15



Test Report Conclusion

Content

1.0	General Details	4
1.1	Test Lab Details.	4
1.2	Applicant Details	4
1.3	Description of EUT	4
1.4	Submitted Sample	4
1.5	Test Duration.	5
1.6	Test Uncertainty.	5
1.7	Test By	5
2.0	List of Measurement Equipment.	6
3.0	Technical Details	7
3.1	Summary of Test Results	7
3.2	Test Standards.	7
4.0	EUT Modification.	7
5.0	Power Line Conducted Emission Test.	8
5.1	Schematics of the Test.	8
5.2	Test Method and Test Procedure.	8
5.3	Configuration of the EUT	8
5.4	EUT Operating Condition.	9
5.5	Conducted Emission Limit.	9
5.6	Test Result.	9
6.0	Radiated Emission test	10
6.1	Test Method and Test Procedure.	10
6.2	Configuration of the EUT	10
6.3	EUT Operation Condition.	10
6.4	Radiated Emission Limit	11
7.0	6dB Bandwidth Measurement Bandwidth	20
8.0	Maximum Peak Output Power	25
9.0	Power Spectral Density Measurement.	27
10.0	Out of Band Measurement.	32
11.0	Antenna Requirement.	35
12.0	FCC Label.	36
13.0	Photo of Test Setup and EUT View.	37

Date: 2017-08-15



1.0 General Details

1.1 Test Lab Details

Name: SHENZHEN TIMEWAY TESTING LABORATORIES.

Address: Room 512-519,5/F., East Tower, Building 4, Anhua Industrial Zone, Futian District, Shenzhen,

Guangdong China

Telephone: (755) 83448688 Fax: (755) 83442996

Site on File with the Federal Communications Commission – United Sates

Registration Number: 899988

For 3m & 10 m OATS

Site Listed with Industry Canada of Ottawa, Canada

Registration Number: IC: 5205A-02

For 3m & 10 m OATS

1.2 Applicant Details

Applicant: SHENZHEN HOTOP ELECTRONIC TECHNOLOGY CO., LTD.

Address: 4 Floor, C1 Building, XiangLi industrial Park, HaoYe Road, Fu Yong Town, Bao'An District,

ShenZhen, China

Telephone: 0755-29124830

Fax: --

1.3 Description of EUT

Product: Remote Control

Manufacturer: SHENZHEN HOTOP ELECTRONIC TECHNOLOGY CO., LTD.

Address: 4 Floor, C1 Building, XiangLi industrial Park, HaoYe Road, Fu Yong Town,

Bao'An District, ShenZhen, China

Brand Name: N/A
Additional Brand Name: N/A
Model Number: VR20

Additional Model Number: ARV13, PBVR21

Type of Modulation GFSK (Bluetooth BLE)

Frequency range 2402-2480MHz Frequency Selection By software

Channel Number 40

1.4 Submitted Sample: 2 Samples

Page 5 of 44 Report No.: FCC1708062

Date: 2017-08-15



1.5 Test Duration 2017-07-03 to 2017-07-07

Test Uncertainty Conducted Emissions Uncertainty = 3.6dB Radiated Emissions Uncertainty =4.7dB

Test Engineer 1.7

The sample tested by

Print Name: Terry Tang

Page 6 of 44

Report No.: FCC1708062

Date: 2017-08-15



2.0 Test Equipment					
Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
ESPI Test Receiver	R&S	ESPI 3	100379	2016-08-22	2017-08-21
TWO	R&S	EZH3-Z5	100294	2016-08-22	2017-08-21
Line-V-NETW		EZH3-Z3	100294	2010-08-22	2017-08-21
TWO	R&S	EZH3-Z5	100253	2016-08-22	2017-08-21
Line-V-NETW		EZ113-Z3	100233	2010-08-22	2017-08-21
	R&S				
Ultra Broadband		HL562	100157	2016-08-23	2017-08-22
ANT					
	R&S	ESDV	100008	2016-08-22	2017-08-21
ESDV Test Receiver					
Impuls-Begrenzer	R&S	ESH3-Z2	100281	2016-08-22	2017-08-21
System Controller	СТ	SC100	-		
Printer	EPSON	РНОТО ЕХЗ	CFNH234850		
Computer	IBM	8434	1S8434KCE99BLXLO*	-	-
Loop Antenna	EMCO	6502	00042960	2016-08-23	2017-08-22
ESPI Test Receiver	R&S	ESI26	838786/013	2016-08-22	2017-08-21
3m OATS			N/A	2016-08-24	2017-08-23
Horn Antenna	R&S	BBHA 9170	BBHA9170265	2016-08-24	2017-08-23
Horn Antenna	R&S	BBHA 9120D	9120D-631	2016-08-24	2017-08-23
Power meter	Anritsu	ML2487A	6K00003613	2016-08-22	2017-08-21
Power sensor	Anritsu	MA2491A	32263	2016-08-22	2017-08-21
Bilog Antenna	Schwarebeck	VULB9163	9163/340	2016-08-23	2017-08-21
LISN	AFJ	LS16C	10010947251	2016-08-22	2017-08-21
LISN (Three Phase)	Schwarebeck	NSLK 8126	8126453	2016-08-23	2017-08-22
9*6*6 Anechoic			N/A	2016-08-24	2017-08-23
EMI Test Receiver	RS	ESCS30	100139	2016-08-22	2017-08-21
DE Cabla	SCHWARZBEC			2016 00 22	2017 09 22
RF Cable	K			2016-08-23	2017-08-22
Pre-Amplifier	HP	8447D	2727A05017	2016-08-05	2017-08-04
Pre-Amplifier	EM	EM30265		2016-08-05	2017-08-04

Date: 2017-08-15



3.0 **Technical Details**

3.1 **Summary of test results**

Standard	Test Type	Result	Notes
FCC Part 15, Paragraph 15.107 & 15.207	Conducted Emission Test	N/A	Complies
FCC Part 15 Subpart C Paragraph 15.247(a)(2) Limit	Spectrum bandwidth of a Orthogonal Frequency Division Multiplex System Limit: 6dB bandwidth>500kHz	PASS	Complies
FCC Part 15, Paragraph 15.247(b)	Maximum peak output power Limit: max. 30dBm	PASS	Complies
FCC Part 15, Paragraph 15.109,15.205 & 15.209	Transmitter Radiated Emission Limit: Table 15.209	PASS	Complies
FCC Part 15, Paragraph 15.247(e)	Power Spectral Density Limit: max. 8dBm	PASS	Complies
FCC Part 15, Paragraph 15.247(d)	Out of Band Emission and Restricted Band Radiation Limit: 20dB less than peak value of fundamental frequency Restricted band limit: Table 15.209	PASS	Complies

3.2 **Test Standards**

FCC Part 15 Subpart & Subpart C, Paragraph 15.247

EUT Modification 4.0

No modification by SHENZHEN TIMEWAY TESTING LABORATORIES.

Page 8 of 44

Report No.: FCC1708062

Date: 2017-08-15



5.Power Line Conducted Emission Test

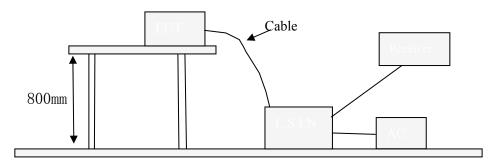
Schematics of the test Test Receiver AC Mains L. I. S. N EUT Load

EUT: Equipment Under Test

5.2 Test Method and test Procedure

The EUT was tested according to ANSI C63.10-2013. The Frequency spectrum From 0.15 MHz to 30MHz was investigated. The LISN used was 50 ohm/50 uH as specified by section 5.1 of ANSI C63.10 -2013.

Test Voltage: 120V~, 60Hz Block diagram of Test setup



5.3 Configuration of The EUT

The EUT was configured according to ANSI C63.10-2013. All interface ports were connected to the appropriate peripherals. All peripherals and cables are listed below.

A. EUT

Device	Manufacturer	Model	FCC ID	
Damata Cantual	SHENZHEN HOTOP ELECTRONIC	VD20 ADV12 DDVD21	24M9C VD20	
Remote Control	TECHNOLOGY CO., LTD.	VR20, ARV13, PBVR21	2AM8S-VR20	

The report refers only to the sample tested and does not apply to the bulk.

Report No.: FCC1708062 Page 9 of 44

Date: 2017-08-15



B. Internal Device

Device	Manufacturer	Model	Rating

C. Peripherals

Device	Manufacturer	Model	Rating

5.4 EUT Operating Condition

Operating condition is according to ANSI C63.10-2013.

- A Setup the EUT and simulators as shown on follow
- B Enable AF signal and confirm EUT active to normal condition

5.5 Power line conducted Emission Limit according to Paragraph 15.207 and 15.107

Frequency	Class A Limits (dB µ V)		Class B Limits (dB µ V)	
(MHz)	Quasi-peak Level	Average Level	Quasi-peak Level	Average Level
$0.15 \sim 0.50$	79.0	66.0	66.0~56.0*	56.0~46.0*
$0.50 \sim 5.00$	73.0	60.0	56.0	46.0
$5.00 \sim 30.00$	73.0	60.0	60.0	50.0

Notes:

- 1. *Decreasing linearly with logarithm of frequency.
- 2. The tighter limit shall apply at the transition frequencies

5.6 Test Results

The frequency spectrum from 0.15MHz to 30MHz was investigated. All reading are quasi-peak values with a resolution bandwidth of 9kHz.

Note: EUT powered by 2 pcs AAA batteries, this test item is not applicable.

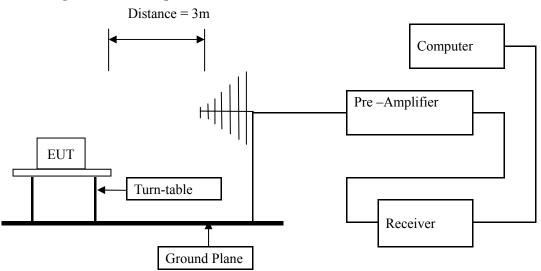
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6 Radiated Emission Test

- 6.1 Test Method and test Procedure:
- (1) The EUT was tested according to ANSI C63.10-2013. The radiated test was performed at Timeway EMC Laboratory. This site is on file with the FCC laboratory division, Registration No. 899988
- (2) The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.10-2013.
- (3) The frequency spectrum from 30 MHz to 25 GHz was investigated. All readings from 30 MHz to 1 GHz are Quasi-peak values with a resolution bandwidth of 120 kHz. For measurement above 1GHz, peak values with RBW=1MHz VBW=3MHz and PK detector. AV value with RBW=1MHz, VBW=3MHz and RMS detector. Measurements were made at 3 meters.
- (4) The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.
- (5) Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limit), and are distinguished with a "QP" in the data table.
- (6) The antenna polarization: Vertical polarization and Horizontal polarization.

Block diagram of Test setup



- 6.2 Configuration of The EUT

 Same as section 5.3 of this report
- 6.3 EUT Operating Condition
 Same as section 5.4 of this report.

Report No.: FCC1708062 Page 11 of 44

Date: 2017-08-15



6.4 Radiated Emission Limit

All emission from a digital device, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified below:

Frequencies in restricted band are complied to limit on Paragraph 15.209 and 15.109

Frequency Range (MHz)	Distance (m)	Field strength (dB µ V/m)
30-88	3	40.0
88-216	3	43.5
216-960	3	46.0
Above 960	3	54.0

Note:

- 1. RF Voltage $(dBuV) = 20 \log RF \text{ Voltage } (uV)$
- 2. In the Above Table, the higher limit applies at the band edges.
- 3. Distance refers to the distance in meters between the measuring instrument antenna and the EUT
- 4. This is a handhold device. The radiated emissions should be tested under 3-axes position (Lying, Side, and Stand), After pre-test. It was found that the worse radiated emission was get at the lying position.

Report No.: FCC1708062 Page 12 of 44

Date: 2017-08-15



Test result

General Radiated Emission Data and Harmonics Radiated Emission Data

Radiated Emission In Horizontal (30MHz----1000MHz)

Charging and Keep Bluetooth Transmitting EUT set Condition:

Results: Pass

Frequency (MHz)	Level@3m (dB \u03b4 V/m)	Antenna Polarity	Limit@3m (dB \u03b4 V/m)
30.840	31.26	Н	40.00
933.520	39.96	Н	46.00
32.360	31.05	V	40.00
966.280	40.03	V	54.00

Page 13 of 44

Report No.: FCC1708062

Date: 2017-08-15



Test Figure:

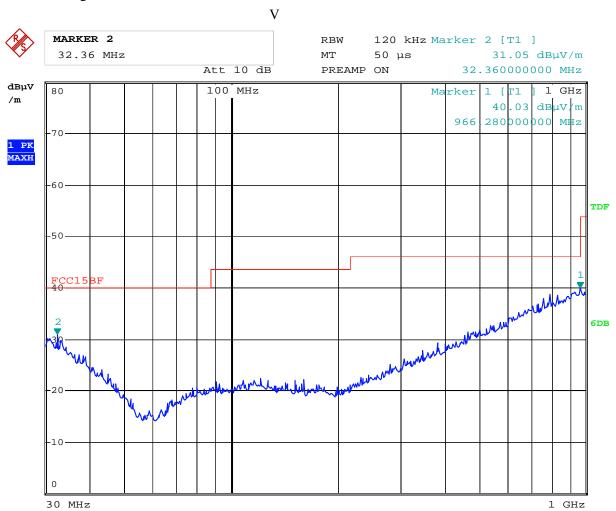
H MARKER 2 RBW 120 kHz Marker 2 [T1] 30.84 MHz 50 µs 31.26 dBµV/m MТ Att 10 dB 30.840000000 MHz PREAMP ON dΒμV 100 MHz Marker /m 39 96 dBµV/m 933.520000000 MHz 1 PK MAXH -60 TDF -50 white and the second of the se 6DB 30 MHz 1 GHz

Report No.: FCC1708062 Page 14 of 44

Date: 2017-08-15



Test Figure:



Report No.: FCC1708062 Page 15 of 44

Date: 2017-08-15



Operation Mode: Transmitting under Low Channel (2402MHz)

	0		
Frequency (MHz)	Level@3m (dB \u03b4 V/m)	Antenna Polarity	Limit@3m (dB \u03b4 V/m)
4804		H/V	74(Peak)/ 54(AV)
7206		H/V	74(Peak)/ 54(AV)
9608		H/V	74(Peak)/ 54(AV)
12010		H/V	74(Peak)/ 54(AV)
14412		H/V	74(Peak)/ 54(AV)
16814		H/V	74(Peak)/ 54(AV)
19216		H/V	74(Peak)/ 54(AV)
21618		H/V	74(Peak)/ 54(AV)
24020		H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit

2. Remark "---" means that the emissions level is too low to be measured

Operation Mode: Transmitting g under Middle Channel (2441MHz)

		·	
Frequency (MHz)	Level@3m (dB \u03b4 V/m)	Antenna Polarity	Limit@3m (dB \mu V/m)
4880		H/V	74(Peak)/ 54(AV)
7320		H/V	74(Peak)/ 54(AV)
9760		H/V	74(Peak)/ 54(AV)
12200		H/V	74(Peak)/ 54(AV)
14640		H/V	74(Peak)/ 54(AV)
17080		H/V	74(Peak)/ 54(AV)
19520		H/V	74(Peak)/ 54(AV)
21960		H/V	74(Peak)/ 54(AV)
24400		H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit

2. Remark "---" means that the emissions level is too low to be measured

Page 16 of 44 Report No.: FCC1708062

Date: 2017-08-15



Operation Mode: Transmitting under High Channel (2480MHz)

	0 0		
Frequency (MHz)	Level@3m (dB \u03b4 V/m)	Antenna Polarity	Limit@3m (dB \mu V/m)
4960		H/V	74(Peak)/ 54(AV)
7440		H/V	74(Peak)/ 54(AV)
9920		H/V	74(Peak)/ 54(AV)
12400		H/V	74(Peak)/ 54(AV)
14880		H/V	74(Peak)/ 54(AV)
17360		H/V	74(Peak)/ 54(AV)
19840		H/V	74(Peak)/ 54(AV)
22320		H/V	74(Peak)/ 54(AV)
24800		H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit

^{2.} Remark "---" means that the emissions level is too low to be measured

18000.00 MHz

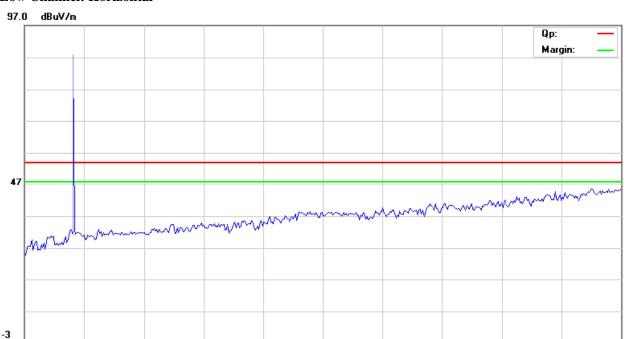
Report No.: FCC1708062

Date: 2017-08-15



Please refer to the following test plots for details:

Low Channel: Horizontal



9500.00

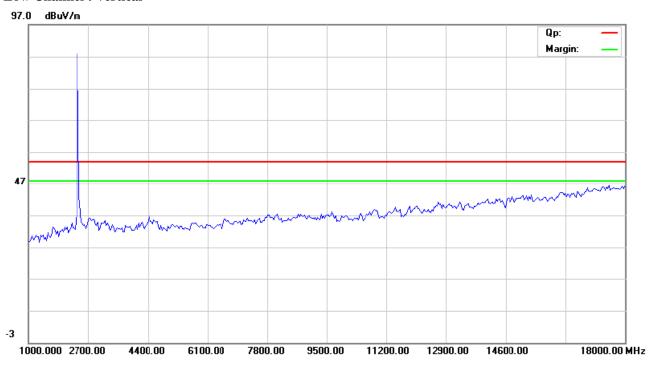
11200.00

12900.00

14600.00

Low Channel: Vertical

1000.000 2700.00



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6100.00

4400.00

7800.00

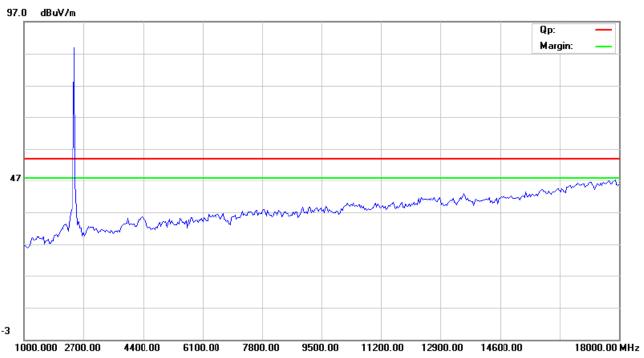
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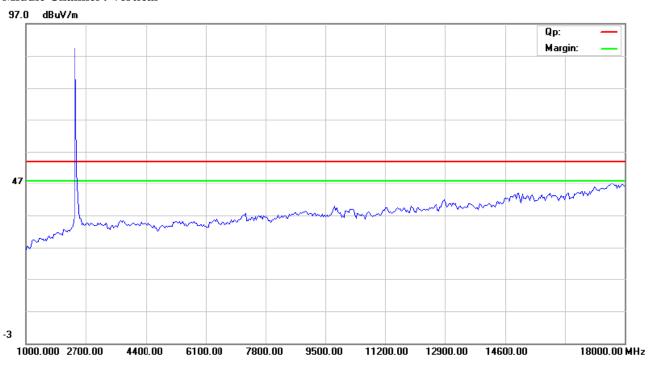
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Middle Channel: Horizontal



Middle Channel: Vertical



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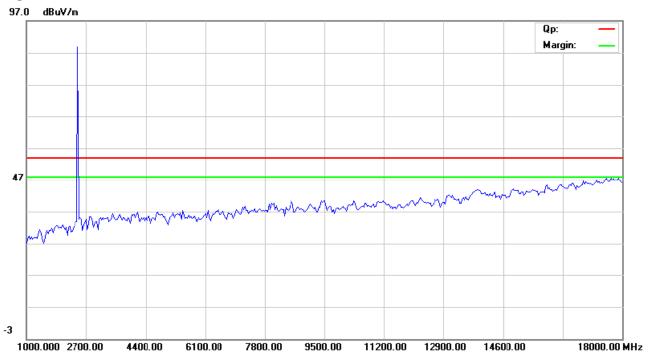
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adopt any other remedies which may be appropriate.

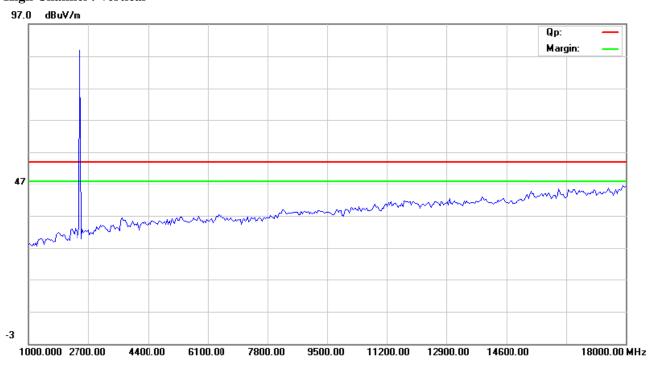
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High Channel: Horizontal



High Channel: Vertical



Note: for the radiated emissions above 18G, it is the floor noise.

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Page 20 of 44

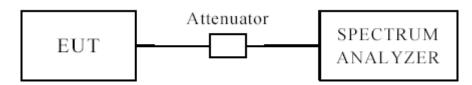
Report No.: FCC1708062

Date: 2017-08-15



7.0 6dB Bandwidth Measurement

7.1 Test Setup



7.2 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is >500 kHz

7.3 Test Procedure

- 1. Set resolution bandwidth (RBW) = 100 kHz
- 2. Set the video bandwidth (VBW) \geq 3 x RBW.
- 3. Detector = Peak.
- 4. Trace mode = \max hold.
- 5. Sweep = auto couple.
- 6. Allow the trace to stabilize.
- 7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

7.4 Test Result

Page 21 of 44 Report No.: FCC1708062

Date: 2017-08-15



6dB BW

EUT Remote		e Control	Model		VR20		
Mode Keep Tr		ansmitting	Input Voltage		DC3.7V		
Temperat	mperature 24 deg. C, Humidity		56% RH				
Channel	nel Channel Frequency (MHz)		6 dB Bandwidth (kHz)		Minimum Limit (kHz)		Pass/ Fail
Low		2402	727		0.5		Pass
Middle		2440	727		0.5		Pass
High		2480	727	0		0.5	Pass

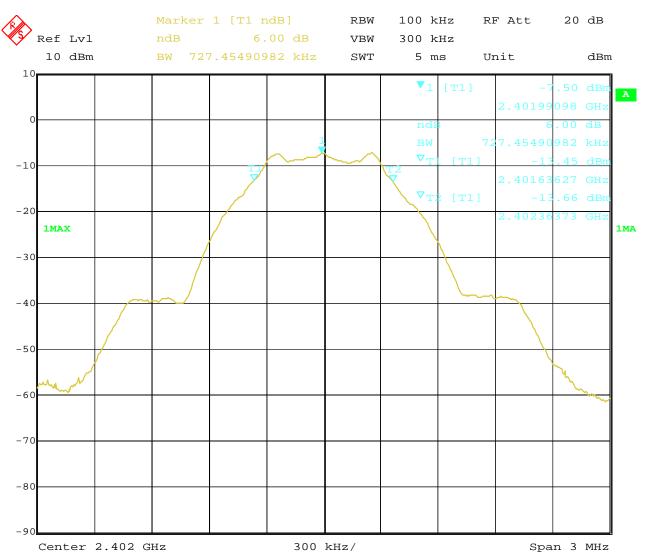
Report No.: FCC1708062 Page 22 of 44

Date: 2017-08-15



Test Figure:

1. Condition: Low Channel

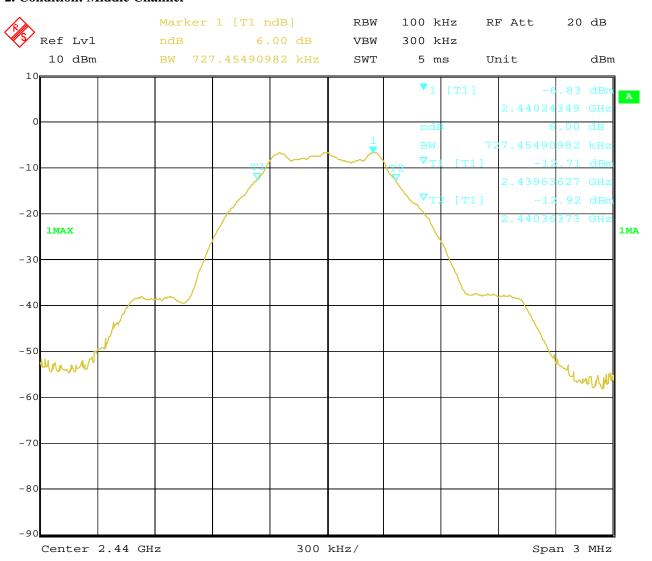


Report No.: FCC1708062 Page 23 of 44

Date: 2017-08-15



2. Condition: Middle Channel

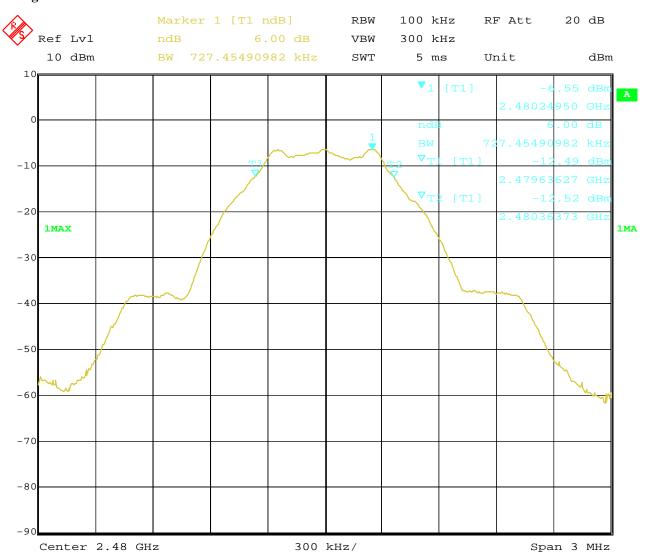


Report No.: FCC1708062 Page 24 of 44

Date: 2017-08-15



3. High Channel



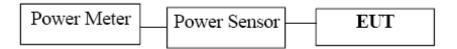
Report No.: FCC1708062 Page 25 of 44

Date: 2017-08-15



8. Maximum Output Power

8.1 Test Setup



8.2 Limits of Maximum Output Power

The Maximum Output Power Measurement is 30dBm.

8.3 Test Procedure

The RF power output was measured with a Power meter connected to the RF Antenna connector (conducted measurement) while EUT was operating in transmit mode at the appropriate centre frequency.

Note: the Peak power were measured.

Report No.: FCC1708062 Page 26 of 44

Date: 2017-08-15



8.4Test Results

EUT Remot		e Control	Model	VR20		
Mode		Keep Transmitting		Input Voltage	DC3.7V	
Temperature		24 deg. C,		Humidity	56% RH	
Channel		nannel Frequency	Max. Power Output (dBm)		Peak Power Limit	Pass/ Fail
Chamier		(MHz)	Peak		(dBm)	
Low		2402	-6.40		30	Pass
Middle		2440	-5.8	80	30	Pass
High		2480	-5.4	13	30	Pass

Note: 1. the result basic equation calculation as follow:

Max. Power Output = Power Reading + Cable loss + Attenuator

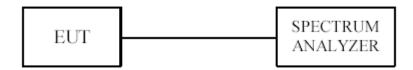
Report No.: FCC1708062 Page 27 of 44

Date: 2017-08-15



9. Power Spectral Density Measurement

9.1 Test Setup



9.2 Limits of Power Spectral Density Measurement

The Maximum Power Spectral Density Measurement is 8dBm.

9.3 Test Procedure

- 1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
- 2. Set the RBW = 10 kHz.
- 3. Set the VBW \geq 30 kHz.
- 4. Set the span to 1.5 times the DTS channel bandwidth.
- 5. Detector = peak.
- 6. Sweep time = auto couple.
- 7. Trace mode = max hold.
- 8. Allow trace to fully stabilize.
- 9. Use the peak marker function to determine the maximum amplitude level.
- 10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.
- 11. The resulting peak PSD level must be ≤ 8 dBm.

Page 28 of 44 Report No.: FCC1708062

Date: 2017-08-15



9.4Test Result

EUT		Remote Control		Model		VR20	
Mode		Keep Transmitting		Input Voltage	Γ	DC3.7V	
Temperature		2	24 deg. C,		Humidity	5	6% RH
Channel	Channel Peak Power Reading (dBm)		Cable Loss (dB)	Final Power Spectral Density (dBm)		Maximum Limit (dBm)	Pass/ Fail
Low	-1	6.57	0.2		-16.37	8	Pass
Middle	-1	5.78	0.2		-15.58	8	Pass
High	High -15.47		0.2		-15.27	8	Pass

Note: The result basic equation calculation as follow:

Peak Power Output = Peak Power Reading + Cable loss

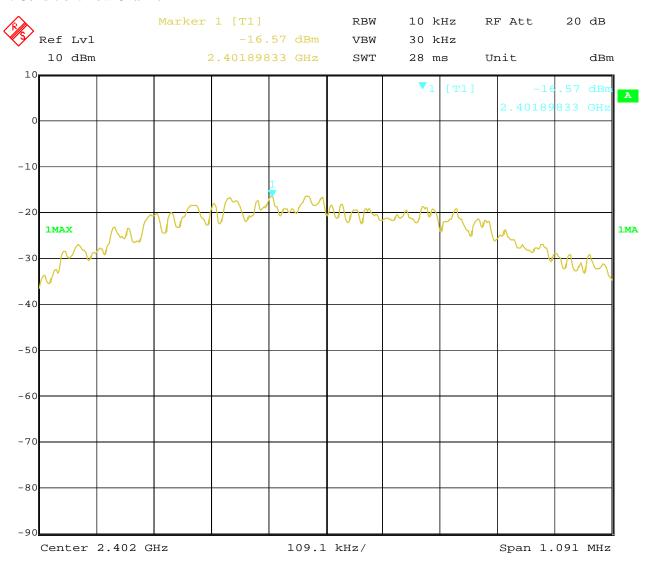
Report No.: FCC1708062 Page 29 of 44

Date: 2017-08-15



Test Figure:

1. Condition: Low Channel

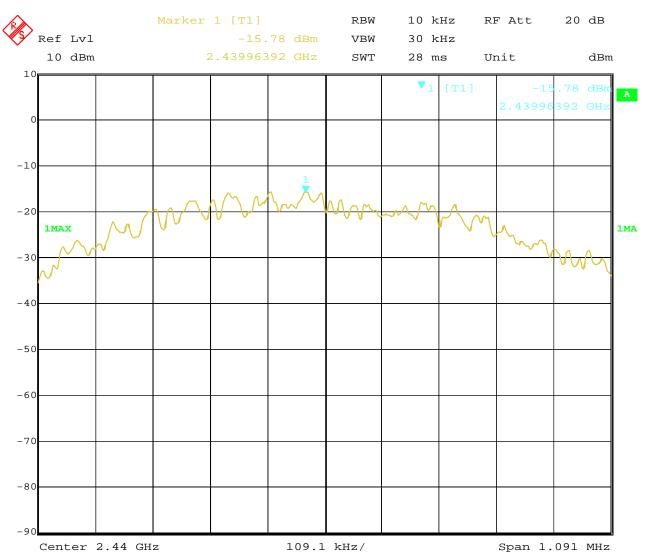


Report No.: FCC1708062 Page 30 of 44

Date: 2017-08-15



2. Condition: Middle Channel

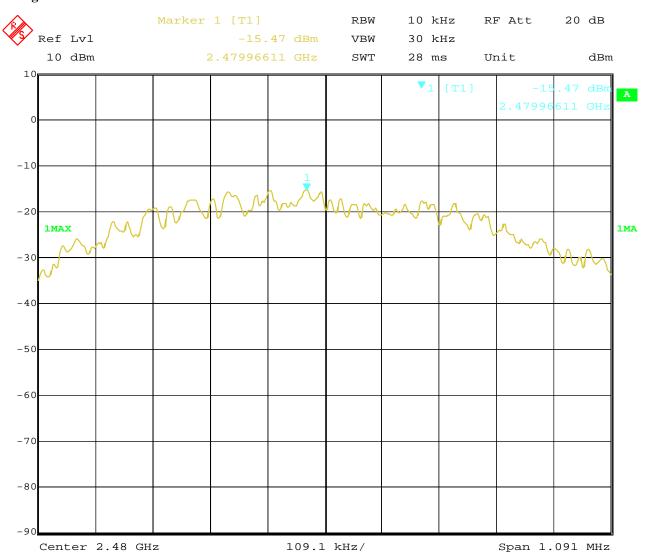


Report No.: FCC1708062 Page 31 of 44

Date: 2017-08-15



3. High Channel

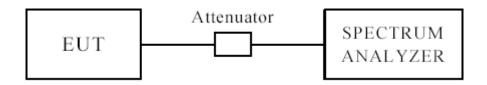


Report No.: FCC1708062 Page 32 of 44

Date: 2017-08-15



10 Out of Band Measurement 10.1 Test Setup for band edge



The restricted band requirement based on radiated emission test; please see the clause 6 for the test setup

10.2 Limits of Out of Band Emissions Measurement

- 1. Below –20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).
- 2. Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.

10.3 Test Procedure

For signals in the restricted bands above and below the 2.4-2.483GHz allocated band a measurement was made of Radiated emission test. (Peak values with RBW=1MHz, VBW=3MHz and PK detector. AV value with RBW=1MHz, VBW=3MHz and RMS detector)

For bandage test, the spectrum set as follows: RBW=VBW=100 kHz. A conducted measurement used

10.4 Test Result

Please see next pages

Note: 1. For band-edge measurement, the frequency from 30MHz-25GHz was tested. And It met the FCC rule.

2. This is a handhold device. The radiated emissions should be tested under 3-axes position (Lying, Side, and Stand), After pre-test. It was found that the worse radiated emission was get at the lying position.

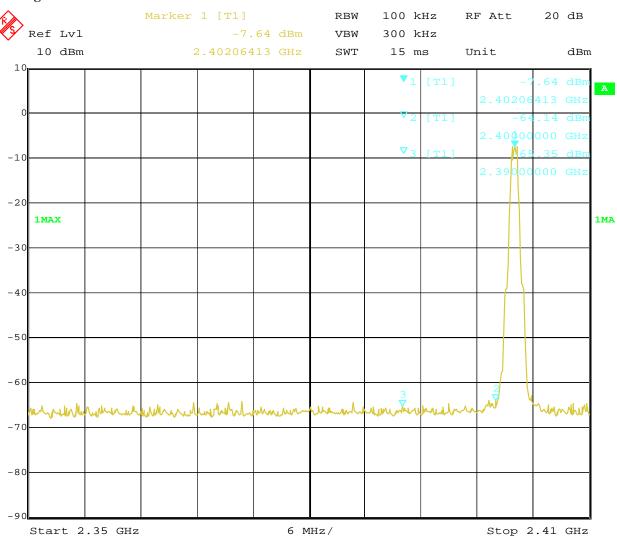
Date: 2017-08-15



10.4 Band-edge and Restricted band Measurement

EUT	Remote C	Control	Model	VR20			
Mode	Keep Transmitting		Input Voltage	DC3.7V			
Temperature	Semperature 24 deg. C,		Humidity	56% RH			
Test Result:	Pas	S	Detector	PK			
2400	PK (dBμV/m)	42.1	T ::4	74(dBμV/m)			
	AV (dBμV/m)		Limit	54(dBμV/m)			
2390	PK (dBμV/m)	39.6	Limit	74(dBμV/m)			
	AV (dBμV/m)		Lillit	54(dBμV/m)			

Test Figure:



Note: The Max. FS in Restrict Band are measured in conventional method.

Page 34 of 44

Report No.: FCC1708062

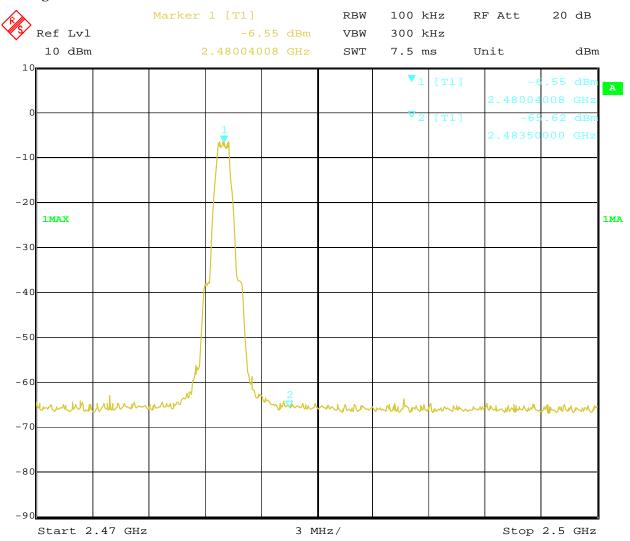
Date: 2017-08-15



10.4 Band-edge and Restricted band Measurement

EUT	Rem	ote Control	Model	VR20
Mode	Mode Keeping Transmitting			DC3.7V
Temperature	24	4 deg. C,	Humidity	56% RH
Test Result:	ult: Pass		Detector	PK
2483.5	PK (dBμV/m)	40.6	T ::4	$74(dB\mu V/m)$
	AV $(dB\mu V/m)$		Limit	$54(dB\mu V/m)$

Test Figure:



Note: The Max. FS in Restrict Band are measured in conventional method.

Date: 2017-08-15



Page 35 of 44

11.0 Antenna Requirement

11.1 Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (b), if transmitter antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the mount in dB that the directional gain of the antenna exceeds 6 dBi.

11.2 Antenna Connected construction

PCB antenna used. The maximum Gain of the antennas is 0dBi.

Report No.: FCC1708062 Page 36 of 44

Date: 2017-08-15

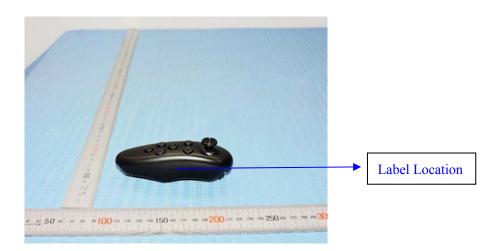


12.0 FCC ID Label

FCC ID: 2AM8S-VR20

The label must not be a stick-on paper label. The label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

Mark Location:



Date: 2017-08-15



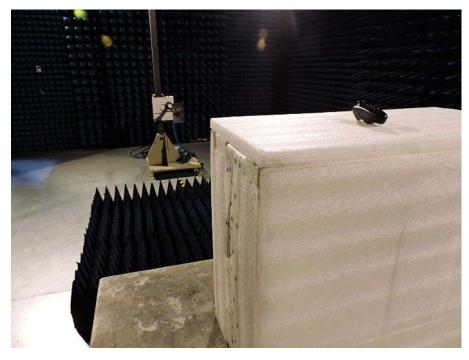
13.0 Photo of testing

Conducted Emission Test Setup:

N/A

Radiated Emission Test Setup:





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Photographs - EUT

Outside view





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Outside view





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Report No.: FCC1708062 Page 40 of 44

Date: 2017-08-15

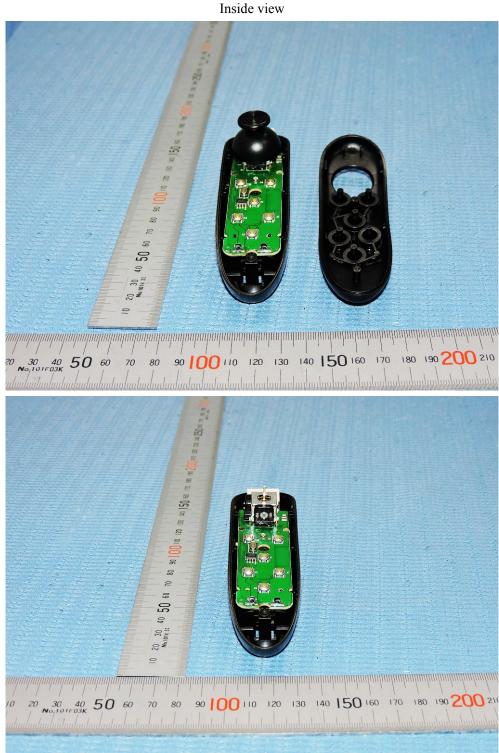


Outside view



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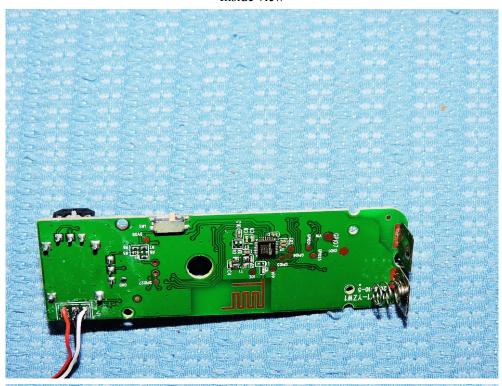
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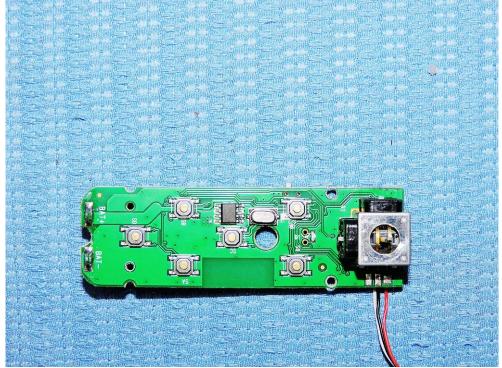
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Inside view





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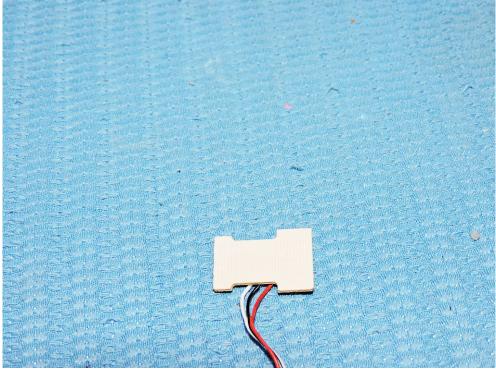
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Inside view





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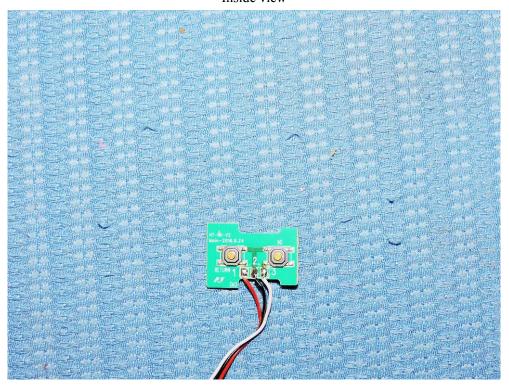
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Report No.: FCC1708062 Page 44 of 44

Date: 2017-08-15



Inside view



End of the report